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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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08/636,069 04/22/96 SANDHU

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EXAMINER

KIELIN, E

ART UNIT

PAPER NUMBER

2813

DATE MAILED:

08/30/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trad marks

Office Action Summary

Application No.

08/636,069

Applicant(s)

Sandhu et al.

Examiner

Erik Kielin

Group Art Unit

2813

☒ Responsive to communication(s) filed on Jul 10, 2000

☐ This action is FINAL.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1, 2, 4-6, and 31-54 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1, 2, 4-6, and 31-54 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

Art Unit: 2813

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-2, 4-6, 31-41, 42, 43-44, 45-47, 48-49, 50-52, 53-54 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicant has not provided enablement for the temperature range of "at least 480 C to about 700 C." Instead the specification only mentions temperature at page 7, lines 6-7, and indicates "Temperature: 200 C to 700 C., with 480 C. being deemed optimum for integrated circuit manufacture." This is far from the statement, "Applicant's specification suggests the temperature ranges and supports the reasons for such ranges." (See Applicant's Response to the previous action, in Paper no. 20, on page 8, lines 17-18.) The only temperature range supported by the specification is 200-700 C -- not the now claimed "at least 480 C to about 700 C."

Art Unit: 2813

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2, 4-10, 31, 33-34, 36, 39-41, 42, 43-44, 45-47, 48-49, 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2-050966 (Hisamune).

Hisamune clearly discloses Applicant's invention, but does not (1) expressly teach a temperature range of "at least 480 C to 700 C;" or (2) specifically state in the Abstract that the functional atomic oxygen would be increased by the light source and thereby reduce the fixed charge in the oxide layer.

Regarding (1), it has been held that ranges near the prior art general conditions is *prima facie* obvious absent evidence of unexpected results. See *In re Huang*, 40 USPQ2d 1685, 1688(Fed. Cir. 1996)(claimed ranges of a result effective variable, which do **not** overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in **kind** and not merely in degree from the results of the prior art).

Furthermore, Hisamune teaches that films may be deposited at temperatures lower than 400° C while still achieving **sufficient** growth rates which does not rule out higher temperatures. Therefore, it would have been obvious to choose the temperature of Applicant's claimed process

Art Unit: 2813

because Hisamune teaches temperatures near Applicant's and because Hisamune teaches that temperature is related to deposition rate and film density, so that even though lower temperatures may be usable, it would be obvious to increase temperature to provide an even faster deposition rate and more efficient process which provides a quality silicon oxide film, according to the precedent set by *In re Huang*. Further, Applicant's specification fails to show any criticality to the any temperature range -- especially not the one now claimed -- and has not presented evidence of results in the fixed charge of the oxide layer of Hisamune which is different in kind as required by the precedent established in *In re Huang*.

Regarding claim 36, the only difference between applicant's claim 36 and the Hisamune process is that the exact ozone concentrations are not taught. However, it has been held that optimization of result effective variables is obvious. See *In re Aller* 105 USPQ 233, 255 (C.C.P.A. 1955). Therefore, it would have been obvious to optimize the required ozone concentrations to provide effective oxidation of TEOS to form the film taught by the Hisamune reference, according to the precedent set by *In re Aller*.

Regarding (2), since Hisamune uses the same light source as Applicant, it is inherent that the functional oxygen concentration would be elevated and therefore have the same effect on reducing the fixed charge as Applicant has recognized. The claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable. See *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). See also *In re Swinhart*, 169 USPQ 226,229 (CCPA 1971) (where the Patent Office has reason to

Art Unit: 2813

believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that subject matter shown to be in the prior art does not possess the characteristics relied on) and *In re Fitzgerald*, 205 USPQ 594 (CCPA 1980) (the burden of proof can be shifted to the applicant to show that subject matter of the prior art does not possess the characteristic relied on whether the rejection is based on inherency under 35 USC 102 or obviousness under 35 USC 103).

5. Claims 32, **51**, **52**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Hisamune as applied to claim 31 above, and further in view of U.S. Patent 4,287,083 (McDowell et al.).

Hisamune teaches that a mercury lamp should be used, but does not specifically teach a mercury arc vapor lamp.

However, McDowell et al. teach that in the coating industry, mercury arc vapor lamps are well known for providing UV radiation.

Therefore, it would have been obvious to one of ordinary skill in the art at time of the invention to apply the teachings of McDowell et al. because a mercury lamp is required and McDowell teaches that mercury arc vapor lamps work effectively for providing the requisite UV radiation.

Art Unit: 2813

6. Claims 35, 37, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hisamune as applied to claim 31 above, and further in view of U.S. Patent 5,000,113 (Wang et al.).

Hisamune is silent about pressures and the use of Helium as a carrier gas.

However, Wang et al. teach a similar TEOS/ozone process where helium is used as a carrier gas and a pressure range of about 10-200 torr is taught (col. 20, lines 40-49).

Further, it has been held that optimization of result effective variables is obvious. See *In re Aller* 105 USPQ 233, 255 (C.C.P.A. 1955). It has also been held that choosing values within known ranges is *prima facie* obvious. See *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Therefore, it would have been obvious to optimize the pressure to provide effective oxidation of TEOS to form the film taught by the Hisamune reference, according to the precedent set by *In re Aller*. It further would have been obvious to choose Applicant's claimed pressures in the Hisamune process because Wang et al. teaches a similar process with overlapping pressures, according to the precedent set by *In re Wertheim*.

Also, it would have been obvious to use helium as a carrier gas because Hisamune suggests that other carrier gases may be used and because Wang et al. teaches it is well known in the art for use in similar processes.

7. Claims 1, 2, 4-10, 41, 43-44, 45-47, 48-49, 50 are rejected under 35 U.S.C. 103(a) as unpatentable over JP 2-050966 (Hisamune) in view of U.S. Patent 5,633,211 (Imai et al.).

Art Unit: 2813

Hisamune clearly teaches applicant's process of illuminating ozone and a silicon source gas with a mercury arc lamp to deposit silicon dioxide onto a wafer surface. Hisamune further teaches that the reason for irradiating the inside of the reaction furnace with UV radiation is to induce a photochemical reaction of the gaseous starting materials with ozone (translation, p. 5, lns. 20-21). Hisamune teaches a phosphorus dopant may be added, but does not teach a second dopant.

However, Imai teaches that it is conventional to use both boron and phosphorus to form BPSG films which reflow at low temperatures (col. 1, lines 35-42 and col. 2, lines 6-10). Applicant's claimed boron source gases are taught (col. 1, lines 50-60).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to also use a boron source gas to allow reflow at lower temperatures to provide for a more planar surface, as taught by Imai.

The only difference between applicant's claim 46 and the Hisamune process is that no fluorinated precursor is taught.

However, Imai teaches that TEOS may be substituted with a fluorinated precursor to provide better flow of the deposited layer (Abstract and col. 5, lines 41-42).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to apply the fluorinated precursor teachings of Imai to the Hisamune process for the reasons given by Imai.

Art Unit: 2813

8. Claims 53 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hisamune in view of Imai as applied to claim 52 above, and further in view of McDowell et al..

Hisamune and Imai do not teach a mercury arc vapor lamp.

McDowell et al is applied as above.

Response to Arguments

9. Applicant's arguments filed 7/31/00 have been fully considered but they are not persuasive.

Applicant's Representative suggests that the invention of Hisamune are different for the following reasons:

(1) Hisamune is directed to forming PSG rather than "only to BPSG," and

(2) Hisamune uses a low temperature process whereas the instant invention uses a "higher temperature process." (See Paper No.20, page 8, lines 5-8.)

Regarding (1), Examiner does *not* believe that one of ordinary skill would be perplexed at adding a second, well-known dopant to the process gases to make a notoriously well-known glass (BPSG) when Hisamune has already indicated that the process works with a single dopant. Furthermore, it appears that Applicant's Representative has misdirected himself as to the scope of the instant invention in that nowhere does the specification or the claims indicate that the invention is "directly **only** to BPSG..." (Emphasis added.) For example, independent claim 31 mentions no dopant source at all. Independent claims 42 and 52 recite "at least **one** dopant source" which is clearly anticipated by Hisamune. Claims 46-48, 50 are drawn to **fluorosilicate**

Art Unit: 2813

glass. Applicant's specification on page 8, lines 21-23 indicates that **no** dopant sources are necessary which further clearly indicates that the presence of a particular dopant has no bearing whatsoever upon the effect of "functional atomic oxygen" in reducing fixed charge in the CVD oxide. Therefore, one of ordinary skill would not be put off using notoriously well-known dopants in the method of Hisamune.

Regarding (2), Examiner respectfully disagrees that the instant invention teaches a higher temperature. Nowhere in the specification does Applicant teach a "higher temperature process" rather Applicant indicates that a temperature in the range of 200 C to 700 C with 480 C being optimum for integrated circuits. (Specification, page 7, lines 6-7). Therefore, the argument concerning Applicant's claimed temperature is moot, since Applicant himself has not enabled the temperature range now claimed. (See 35 USC 112, first paragraph rejection above.)

Applicant's Representative also alleges that the former Examiner has taken Official notice by "substitution of his own knowledge," but has not provided for what elements Official Notice was given. The present Examiner can find no such Official Notice and requests that Applicant's Representative provide specifically what information prior art is required.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 4,916,091 (Freeman et al.) also teaches a process similar to applicant's claims (see col. 16, ln. 63 to col. 17, ln. 55).

Art Unit: 2813

Any inquiry concerning this communication from examiner should be directed to Erik Kielin whose telephone number is (703) 306-5980. The examiner can normally be reached by telephone on Monday through Thursday 9:00 AM until 7:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Bowers, can be reached on (703) 308-2417. The fax phone number for the group is (703) 308-7722 or -7724.

EK

EK

August 29, 2000

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